



Impact of water repellency on infiltration of differently concentrated ethanol solutions

Pavel Dlapa, Andrej Hrabovský, Dávid Hriník, and Peter Kuric

Comenius University, Faculty of Natural Sciences, Department of Soil Science, Bratislava, Slovakia (dlapa@fns.uniba.sk)

Infiltration experiments were carried out on an extremely (WDPT > 3600 s) water repellent forest soil in the Little Carpathians Mts (SW Slovakia). Measurements were performed following a long dry warm period using the Mini Disk Infiltrometer (Decagon). Replicated infiltration experiments were conducted with water and five different ethanol solutions. The infiltrometer was set to a capillary pressure head of -2 cm and filled with solutions containing 0, 5, 10, 20, 40, and 95% of ethanol by volume, respectively. Solutions used in infiltration experiments differed in density, viscosity, and surface tension. Combined effect of solution properties on infiltration into soil is strongly dependent on soil surface properties. This may lead to a decrease of infiltration rate with increasing ethanol concentration. Such behaviour should be observable in wettable soils. However, the infiltration experiments revealed a significant increase in the rate of infiltration for increasing concentrations of ethanol. The solutions showed infiltration rates of 10-4, 10-3, and 10-2 cm/s for the 5, 20, and 95% ethanol solutions, respectively. This trend suggests the dominant influence of contact angle (affected by ethanol concentration) on infiltration process. Measurements allow quantifying changes of various infiltration parameters as a function of the solution properties. The obtained results showed that similar approach can be a valuable alternative to other methods used for the evaluation of severity of soil repellency and impacts to hydrological processes.